APPENDIX B
UPDATE TO ADDENDUM 2 TO THE OVERALL HEALTH AND SAFETY PLAN: TISSUE SAMPLING

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Prepared for

McGinnes Industrial Maintenance Corporation

International Paper Company

Prepared by

Integral Consulting Inc.

719 2nd Avenue, Suite 700

Seattle, Washington 98104

March 2016

CERTIFICATION PAGE

This update to Addendum 2 to the overall health and safety plan (HASP; Anchor QEA 2009) for the San Jacinto River Waste Pits Superfund site (the Site) has been reviewed and approved by Integral Consulting Inc. (Integral) for the fish tissue study at the Site in support of the Remedial Investigation and Feasibility Study (RI/FS) for the Site.

Jennifer Sampson	Stefan Wodzicki
Project Manager	Field Lead
Integral Consulting Inc.	Integral Consulting Inc.
Date: _____	Date: _____

HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT FORM

Project Name: San Jacinto River Waste Pits Superfund Site

This update to Addendum 2 to the overall HASP (Anchor QEA 2009) is approved by Integral for use at the San Jacinto River Waste Pits Superfund site (the Site). The overall HASP and the updated Addendum 2 are the minimum health and safety standard for the Site and will be strictly enforced for Integral personnel and other consulting personnel including subcontractors where applicable.

I have reviewed this update to Addendum 2, dated March 23, 2016, to the overall HASP for the project. I have had an opportunity to ask any questions I may have and have been provided with satisfactory responses. I understand the purpose of the plan, and I consent to adhere to its policies, procedures, and guidelines while an employee of Integral, or its subcontractors.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SITE EMERGENCY PROCEDURES

Emergency Contact Information

Table A

Site Emergency Form and Emergency Phone Numbers

Category	Information	
Chemicals of Potential Concern	Dioxins/Furans, PCBs, mercury	
Minimum Level of Protection	Level D	
Site(s) Location Address	(No formal address, see Figure A) Channelview, TX 77530 Coordinates [29° 47' 38.49"N, 95° 3' 49.55"W]	
Emergency Phone Numbers		
Ambulance	911	
Fire	911	
Police	911	
Poison Control	911 and then 1-800-222-1212 if appropriate	
Project-Specific Health and Safety Officers' Phone Numbers		
Integral Field Lead and Integral Site Safety Officer (SSO)	Stefan Wodzicki	Office: (360) 303-2708 Cell: (360) 303-2708
Integral Corporate Health and Safety Manager (CHSM)	Matthew Behum	Office: (410) 573-1982 ext.512 Cell: (443) 454-1615
Integral Project Manager	Jennifer Sampson	Office: (206) 957-0351 Cell: (360) 286-7552
Anchor QEA Project Manager	David Keith	Office: (228) 818-9626 Cell: (228) 224-2983
Anchor QEA Field Lead and SSO	Christopher Torell	Office: (315) 414-2017 Cell: (315) 254-4954
Anchor QEA CHSM	David Templeton	Office: (206) 287-9130 Cell: (206) 910-4279
Client Contact – McGinnes Industrial Maintenance Corporation (MIMC)	Dave Moreira	Office: (603) 929-5446 Cell: (781) 910-6085
Client Contact – International Paper Company (IPC)	Phil Slowiak	Office: (901) 419-3845 Cell: (901) 214-9550
Reporting Oil and Chemical Spills		
National Response Center	1-800-424-8802	
State Emergency Response System	(512) 424-2138	
EPA Environmental Response Team	(201) 321-6600	

Note: In the event of any emergency, contact both the Integral and Anchor QEA project managers and field leads.

PROJECT-SPECIFIC HEALTH AND SAFETY UPDATES

Dry ice will be used to keep fish tissue frozen and for shipping tissue samples to the analytical laboratory. Work with dry ice will follow SOP AP-09 (Exhibit 1). The safety data sheet for dry ice is also provided in Exhibit 1.

An updated heat exhaustion and heat stroke guidance as well as OSHA Right to Know pamphlet are located in Exhibit 2.

AUTHORITY AND RESPONSIBILITIES OF KEY PERSONNEL

Stefan Wodzicki (proposed Integral field lead and SSO) has oversight responsibility for all health and safety activities as well as the authority to discontinue or modify Site operations when unsafe conditions are observed. The field lead will be in direct contact with the CHSM (Matthew Behum) and project manager (Jennifer Sampson).

Daily safety briefings will take place before work begins. The daily briefing form provided in Exhibit 3 will be used to record the daily meetings.

Figure A

Site Location Map

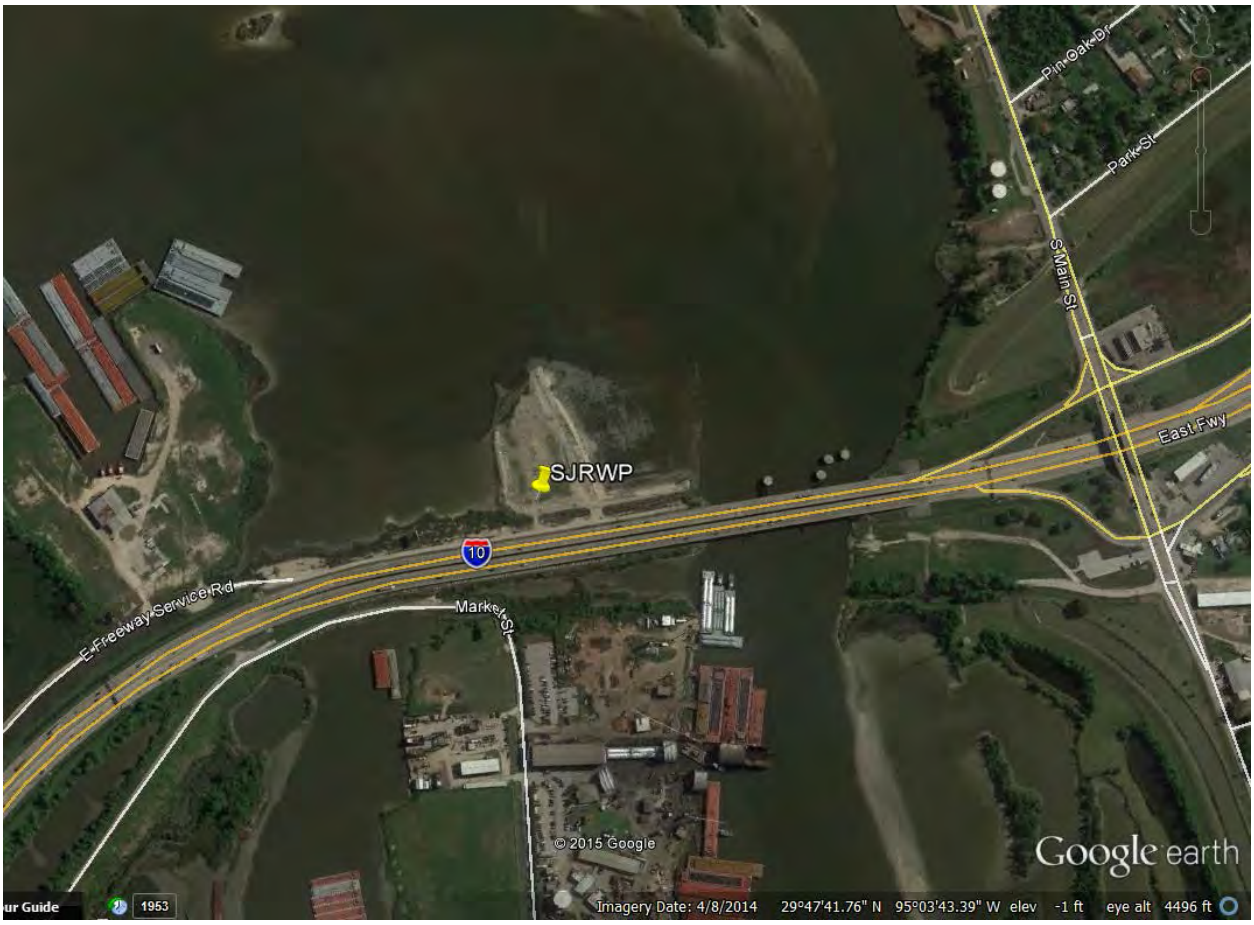


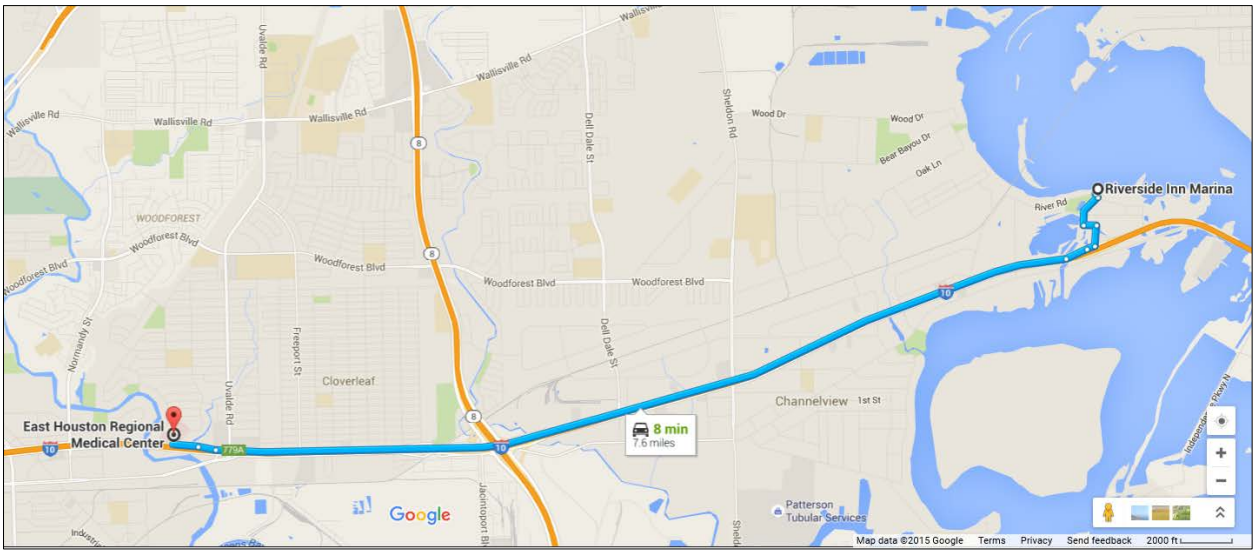
Table B

Hospital Information

Category	Information
Hospital Name	East Houston Regional Medical Center
Address	13111 East Freeway
City, State	Houston, TX 77015
Phone	(713) 393-2000 (general)
Emergency Phone	(713) 393-2118 (emergency room)

Figure B

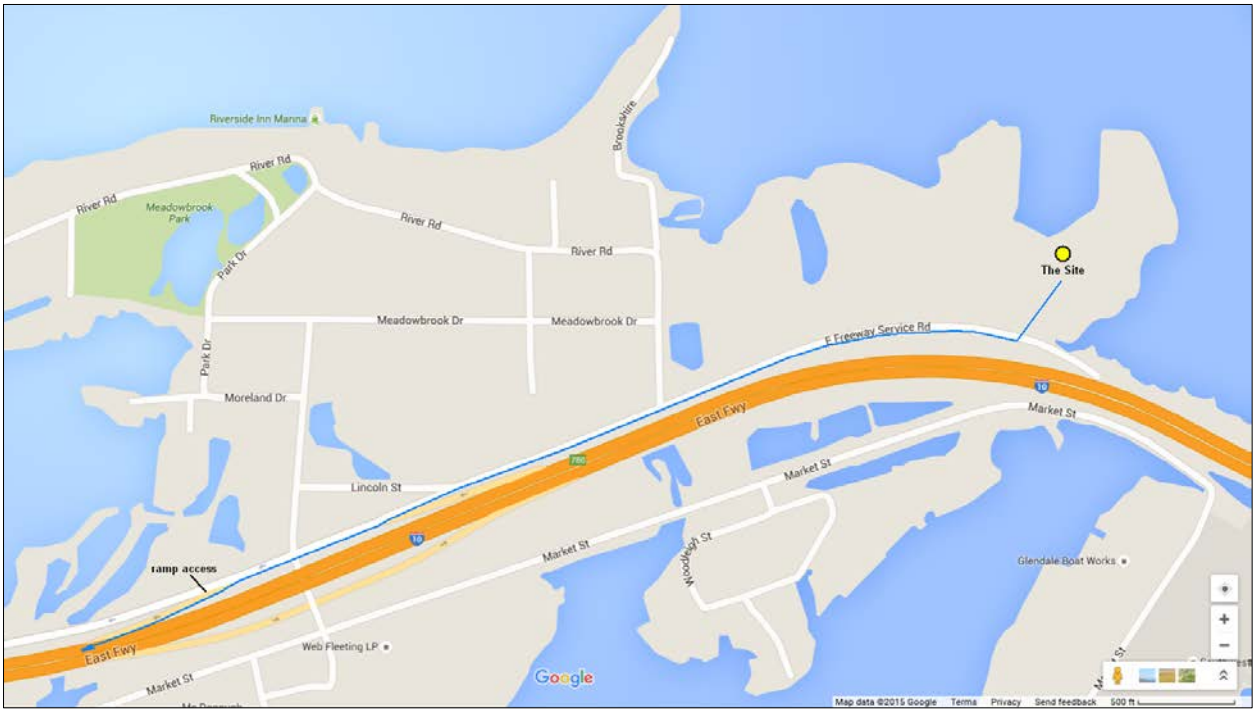
Hospital Route Map from Riverside Inn Marina Boat Ramp



From Riverside Inn Marina boat ramp to East Houston Regional Medical Center.

Figure C

Access from Site to I-10 West



Path to hospital when exiting from Exit 779A on I-10.

Turn right on Rockglen St. after exiting I-10.

East Houston Regional Medical Center emergency entrance

Driving Directions from Riverside Inn Marina to Hospital

Riverside Inn Marina
17433 River Road, Channelview, TX 77530

Get on I-10 W from Park Dr and Monmouth St

2 min (0.8 mi)

1. Head southeast on River Rd toward Park Dr

167 ft

2. Turn right onto Park Dr

0.2 mi

3. Turn left onto Moreland Dr

0.1 mi

4. Turn right onto Monmouth St

0.2 mi

5. Turn right onto E Freeway Service Rd

331 ft

6. Use the left lane to take the ramp onto I-10 W

0.2 mi

Follow I-10 W to East Fwy/E Freeway Service Rd/N Shore Dr. Take exit 779A from I-10 W

6 min (6.7 mi)

7. Merge onto I-10 W

6.5 mi

8. Take exit 779A toward Westmont St

0.1 mi

Merge onto East Fwy/E Freeway Service Rd/N Shore Dr
Destination will be on the right

20 s (0.2 mi)

9. Turn right on Rockglen St.

East Houston Regional Medical Center
13111 East Freeway, Houston, TX 77015

EMERGENCY RESPONSE PROCEDURES

In the event of an emergency, refer to the procedures in the San Jacinto River Waste Pits Superfund Site Overall HASP (Anchor QEA 2009).

A copy of this update to Addendum 2 must be included with the overall HASP, and both copies must be available in the field at all times during fieldwork.

HOUSTON SHIP CHANNEL SECURITY ZONE BOAT OPERATIONS CLEARANCE

The U.S. Coast Guard Vessel Traffic Services (VTF) (281-464-4837) and its Central Office Security Zone Permit Center (281-464-4855) have given Integral clearance for the sampling operations within the San Jacinto River. Fish tissue will be collected from a small boat outside the navigational channel at the locations described in Tissue SAP Addendum 2. The boat does not meet any of the restrictions for the Houston Ship Channel Security Zones, and there is no need for a Notice to Mariners or to notify the local sheriff of the sampling activities in the San Jacinto River area. However, as a courtesy, the field lead will contact the U.S. Coast Guard, at the VTF number above, every morning to let them know about the daily activities. This will include the following:

- Boat size, registration number and brief physical description
- How many people on board
- Telephone contact number
- Activity for the day with start and end times.

Barges and other vessels associated with various shipyard and marine services companies (e.g., San Jacinto River Fleet, Kirby Inland Marine Fleet, and others) may move in and out of the San Jacinto River near the I-10 bridge. Field staff will keep on the lookout for barge traffic during sampling.

EXHIBIT 1
STANDARD OPERATING PROCEDURE AND SAFETY DATA SHEET FOR USING DRY ICE

STANDARD OPERATING PROCEDURE (SOP) AP-09

SAMPLE SHIPPING USING DRY ICE

INTRODUCTION

The procedures outlined in this SOP must be used when a shipment includes *no hazardous materials other than dry ice* for transport by air with a carrier that subscribes to U.S. Department of Transportation (DOT) International Air Transport Association (IATA) standards. DOT and IATA regulate shipments of dry ice because it is a hazardous material. As a result, specific procedures must be followed when packaging and shipping materials refrigerated with dry ice.

Whenever possible, Federal Express (FedEx) should be used as preferred shipping service for sample shipments containing dry ice. Shipments using dry ice can be dropped off at some, but not all, staffed FedEx locations, so it is important to confirm which FedEx locations near the project-specific sampling area will handle dry ice shipments. Packages containing frozen samples and dry ice can be shipped by air to reach their destinations rapidly. However, if time permits, it is permissible to use ground (freight) transportation to save on shipping expenses.

Because UPS and the U.S. Postal Service have extremely restrictive policies concerning shipments of hazardous materials, these carriers should not be used to ship packages containing dry ice.

HAZARD IDENTIFICATION

Dry ice is carbon dioxide in a solid state. It has no liquid state; it sublimates, or turns directly from a solid to a gas. When exposed to room temperature, dry ice will evaporate and release carbon dioxide gas. Caution should be used when handling and using dry ice. DOT and IATA classify dry ice as a "miscellaneous" hazard, class 9. Dry ice is considered hazardous during transport for three reasons:

1. **Explosion hazard:** Dry ice releases a large volume of carbon dioxide gas as it sublimates. If packaged in a container that does not allow for release of the gas, it may explode and cause personal injury or property damage.
2. **Suffocation hazard:** A large volume of carbon dioxide gas emitted in a confined space may create an oxygen deficient atmosphere and may lead to asphyxiation.

3. **Inhalation hazard:** Inhalation of carbon dioxide gas may cause dizziness, an irregular heartbeat, narcosis, or nausea.
4. **Contact hazard:** Dry ice is a cryogenic material that causes severe frostbite upon contact with skin. Do not wear contact lenses when handling dry ice; it may cause burns similar to frostbite between the contact lens and the eye.

All sampling personnel will read the Material Safety Data Sheet (attached) before handling dry ice. Packaging dry ice properly will minimize the risk to personnel transporting the material. The explosion hazard will be eliminated with a package designed to vent gaseous carbon dioxide. Suffocation and inhalation hazards will be greatly reduced by labeling the package correctly, so those who come in contact with it will be aware of the contents. Contact and dermal hazards will be minimized when sampling personnel wear safety glasses, thermal gloves, and closed-toe shoes when working with dry ice. Personnel should also use tongs to transfer the dry ice from one container to another.

U.S. DOT DRY ICE REGULATIONS

Dry ice requires special packaging precautions before shipping by aircraft to comply with U.S. DOT regulations. The *Code of Federal Regulations* (49 CFR 173.217) classifies dry ice as Hazard Class 9 UN1845 (Hazardous Material). These regulations specify the amount of dry ice that may be shipped by air transport and the type of packaging required. Only personnel who have received U.S. DOT Hazardous Material training can ship packages containing dry ice if it is shipped by air or water. Personnel at FedEx have received this training and are able review packaging, labeling, and shipping papers and will authorize the shipment for you.

Labeling Regulations

When shipping with dry ice, correct identification, classification, markings, and labeling must be provided on the outer carton to comply with current requirements of IATA dangerous goods regulations. General marking and labeling requirements must be observed, such as all markings must be in English; all markings and labels must be durable and in the correct location; and only relevant markings and labels are allowed. The following permanent markings are required on the outer packaging of all IATA dry ice shipments:

- "Dry Ice" or "Carbon Dioxide Solid"
- "UN 1845"
- Net weight of dry ice in kilograms (2.2 lb = 1 kg)
- Name and address of the shipper
- Name and address of the recipient.

Packaging Regulations

Packing instructions 954 (listed in the table below) references the general packaging requirements of IATA 5.0.2, meaning that the packaging must be of good quality, compatible with the contents, and sufficient size to accommodate the required labeling.

IATA Table for List of Dangerous Goods (Dry Ice)

Proper shipping name	"Carbon dioxide, solid" or "Dry ice"
UN/ID Number	UN 1845
Class or Division	9
Hazard Label	Miscellaneous
Packing Group	III
Packing Instructions	954
Passenger/Cargo Aircraft	200 kg
Cargo Aircraft Only	200 kg

IATA requirements specific to dry ice include the following:

- Packaging must be designed and constructed to permit the release of carbon dioxide gas. This usually means that the shipping container is not completely sealed at all seams.
- The package must be of adequate strength for the intended use. It must be strong enough to withstand the loading and unloading normally encountered in transport. It must also be constructed and closed to prevent any loss of contents that might be caused by vibration or changes in temperature, humidity, or altitude.
- The package must be of sufficient size to allow for marking and labeling. No labels may fold over from one surface of the container to the next.
- Total net weight of dry ice in the package must be less than the maximum amount specified in the above table.

When using FedEx as the shipper, for both air transportation (including overnight) and ground transportation, packages with 200 kg (441 lb) or less of dry ice are not considered hazardous (unless the shipping container contains other hazardous materials).

PACKING SAMPLES WITH DRY ICE

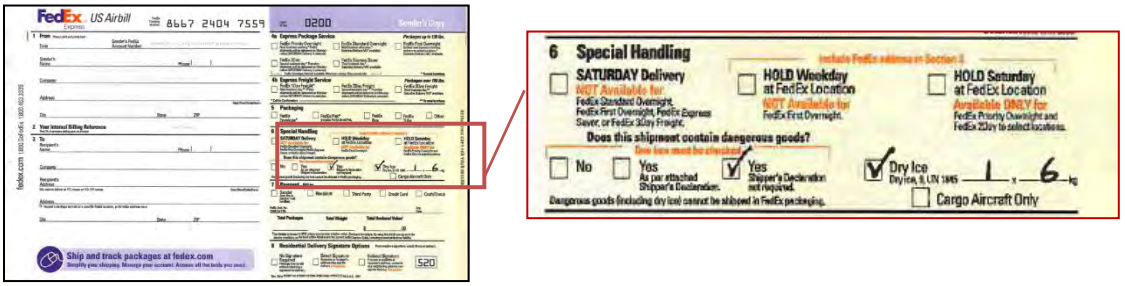
Integral SOP AP-01, *Sample Packaging and Shipping*, SOP AP-02, *Field Documentation*, and SOP AP-03, *Sample Custody,* should be followed when shipping samples using dry ice (e.g., chain-of-custody [COC] forms placed inside a Ziploc® bag and taped to the inside of the

container lid, COC seals affixed to three points outside of container, and if required, project-specific COC tape placed across the lid of the container). A few exceptions to SOP AP-01 are discussed below.

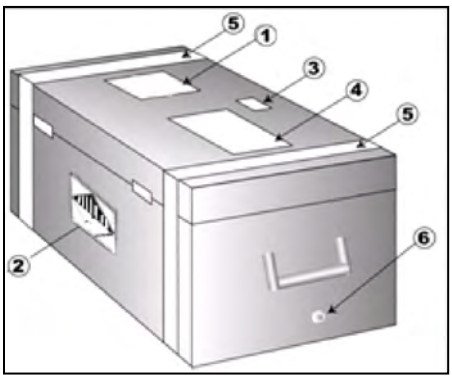
Shipping Requirements

There are five basic requirements for shipments of dry ice:

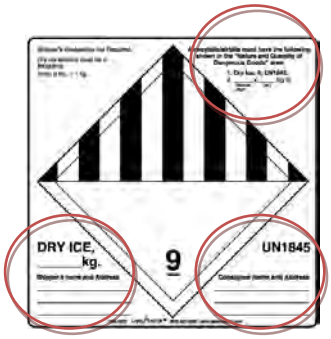
1. **Gas venting**: Packages must allow for release of carbon dioxide gas. Dry ice must never be sealed in a container with an airtight seal such as a jar with a threaded lid or a completely sealed plastic cooler (e.g., do not affix duct tape around gap between lid and body of the cooler; see other options provided below to allow for gas venting during shipment).
2. **Package integrity**: A package containing dry ice must be of adequate strength for its intended use. It must be strong enough to withstand the loading and unloading normally encountered in transport. It must also be constructed and closed to prevent any loss of contents that might be caused by vibration or by changes in temperature, humidity, or altitude.
3. **Package materials**: Do not use plastics that can be rendered brittle or permeable by the temperature of dry ice. This problem can be avoided by using commercially available packages intended to contain dry ice; see below for a list of manufacturers of dry ice shipping containers.
4. **Airbill**: The airbill (also referred to as the air waybill) must include the statement "Dry Ice, Class 9, UN1845, *number of packages* X *net weight in kilograms.*" FedEx has a check box in section 6 of its airbill to satisfy this requirement:



5. **Labeling:** The outermost container must be labeled with a hazard class 9 label, UN 1845, and total weight of dry ice in kilograms. The label should be affixed to a vertical side of the box (not the top or bottom) and oriented as follows:



- **Laboratory Address Label:** Ensure the address label for the analytical laboratory is secure and completely taped over with clear tape.
- **Class 9 Dangerous Goods Label**: List the amount of dry ice in kg (2.2 lb = 1 kg). Place the label on a vertical side of the box (not the top as shown above) and completely tape over the label with clear tape.



- **Fragile and Perishable Goods Labels**: Be sure to completely tape over these labels with clear tape.

- **Airbill**: Fully complete the airbill; enter the information in the following sections:
  - ✓ Section 1 (sender's name, date)
  - ✓ Section 4 (number of total packages, total weight, commodity description
  - ✓ **Commodity Description: Please enter the following "Environmental Samples for RESEARCH PURPOSES ONLY."**

- ✓ Section 7 (dry ice weight in kg)
- ✓ Section 10 (signature, date).

Sample Packaging

The following actions need to be implemented when shipping with dry ice:

1. Freeze samples, blue ice, and a plastic temperature blank solid prior to shipping. Pre-cool the insulated shipping container, if possible. **Note**: When filling the sample jar in the field, be sure to leave headspace in the sample jar to allow for expansion of sample (e.g., sediment or water) when frozen. Otherwise, sample jars will crack and the sample will be lost.
2. Wrap all glass or plastic sample jars, or sediment core tubes in bubble wrap as per the usual packing protocol. **Do not place the dry ice in direct contact with any glass or plastic sample jars or core tubes.** The glass and plastic will crack and break if it comes into direct contact with the dry ice. If necessary, place a barrier between the glass or plastic jars or core tubes (e.g., a layer of clean cardboard, clean packing peanuts, or a layer of wadded-up clean paper on top of the samples).
3. Purchase dry ice from local supplier (determine dry ice purchase locations near the project-specific sampling area prior to field event).
4. For overnight shipments to the laboratory, ensure the weight of the sample shipping container (i.e., insulated box or cooler) does not exceed 150 lb.
5. Weigh the dry ice before you put it in the sample shipping container (the weight of the dry ice MUST be written on the Class 9 Dangerous Goods label prior to shipping) (see item #5 under "Labeling" section provided above).
6. Choose the correct size of sample shipping container to provide sufficient dry ice exposure to the samples to keep them frozen (i.e., small amount of sample planned for shipment, then use a smaller container); do not ship in Styrofoam cooler (the dry ice could "melt" through the container).
7. Keep the dry ice, blue ice, and pre-frozen samples, in the freezer for as long as possible on the day of shipping; coordinate with FedEx regarding the best time to get the sample to the counter for shipping. When shipping samples with dry ice, it is advisable to package and ship the samples later in the afternoon to give the dry ice as much "staying power" as possible. Five pounds of dry ice will sublimate within 24 hours.
8. Minimize the volume of air to which the dry ice is exposed to slow the rate of sublimation. If there is any air space after the package is filled with dry ice and blue ice, fill the space with packing peanuts or crumpled paper.

9. Secure the samples in such a way that when the dry ice sublimates, the samples will not move freely inside of the shipping container (i.e., insulated box or cooler). This can be accomplished by wedging the samples in place with clean cardboard or clean Styrofoam. As mentioned above, fragile containers such as glass jars or vials should be individually wrapped with cushioning material.
10. When using dry ice for shipping, it is important to determine how much dry ice is needed to maintain the proper temperature throughout the entire transit time of the shipment. The table below provides a guide to determine how much dry ice is needed, based on the weight of the perishable product and transit time.

Average Amounts of Dry Ice for Packing Frozen Samples in a Single Well-Insulated Container

Weight of Frozen Sample	Time In Transit			
	4 Hours	12 Hours	24 Hours	2 Days
2 lb	2 lb Dry Ice	3 lb Dry Ice	5 lb Dry Ice	10 lb Dry Ice
5 lb	3 lb Dry Ice	4 lb Dry Ice	8 lb Dry Ice	15 lb Dry Ice
10 lb	4 lb Dry Ice	5 lb Dry Ice	10 lb Dry Ice	20 lb Dry Ice
20 lb	5 lb Dry Ice	8 lb Dry Ice	15 lb Dry Ice	25 lb Dry Ice
50 lb	10 lb Dry Ice	15 lb Dry Ice	20 lb Dry Ice	30 lb Dry Ice

Note: For each additional day, add 8 to 15 lb.

Example: For an overnight shipment of 5 lb of sample, a minimum of 8 lb of dry ice should be placed in the shipping container.

11. Ask FedEx about the length of time for ground shipping to the laboratory, add a day, and then determine the weight of dry ice to sample mass in the cooler.
12. Do not write "specimens" or "samples" on the outside of the shipping container; there should not be any misunderstanding about the shipment.
13. Wear work gloves and use tongs when handling the dry ice; do not use nitrile gloves, which provide insufficient dermal protection, when handling the dry ice.
14. Pack the sample shipping container. If using a cooler, place a layer of bubble wrap (per Integral SOP AP-01) in the bottom of the cooler, and line the cooler with a 2-mil plastic "contractor-type" garbage bag (per Integral SOP AP-01). If shipping frozen tissue samples, place adequate absorbent material such as pads, cellulose wadding or paper towels in the bottom of the garbage bag to prevent leakage.

15. Place the individually bagged and bubble wrapped sediment or tissue samples within the garbage bag on the bottom of the cooler, place the dry ice on top of and around the samples. If the samples are in glass or plastic containers, place a piece of clean cardboard, packing peanuts, or a layer of wadded-up clean paper on top of the samples (to prevent sample jar/core tube breakage) and then place the dry ice on top of this layer. As mentioned above, glass and plastic sample jars/core tubes will crack and break if they come into direct contact with the dry ice.
16. Place frozen blue ice packets around the samples as a backup to keep the samples cold in the event that the dry ice sublimates during transit to the laboratory.
17. Make sure that any extra space within the sample shipping container is filled. This will prevent the samples from shifting during transport and any extra space may cause the dry ice to warm faster. Filling in any extra space will keep the samples frozen longer. Dead air space will cause the dry ice to sublimate faster.
18. Place the frozen plastic temperature blank in the sample shipping container with the frozen samples.
19. Close the liner bag, but *do not* seal it or tie it closed; the carbon dioxide gas created by the dry ice must be allowed to vent.
20. Wrap each end of the cooler needs with strapping tape at least three times.
21. ***Ensure proper venting of the dry ice***. There are three possible options for venting if samples are to be transported in a cooler rather than packaging specifically designed for dry ice transport (see below). The first and preferred option is not to place duct tape around the cooler between the cooler's body and lid. A second option is to leave the cooler drain hole open (inside and outside). A third option is to drill several vent holes near the top of the vertical sides of the cooler (not in the lid) to allow carbon dioxide gas to escape. If vent holes are drilled into the cooler, place the dry ice on the bottom of the cooler rather than the top to keep samples as cold as possible (i.e., dry ice, insulating layer such as piece of clean cardboard, packing peanuts, or a wadded-up clean paper, then the samples). To prevent debris from falling into the cooler, install wire screen or cheesecloth in the vents to keep foreign materials from contaminating the cooler. When the samples are packaged, exercise care to keep these vents open to prevent the buildup of pressure.
22. Place correct labels (as specified above) and completed airbill on the sample shipping container.
23. Complete the IATA "Acceptance Checklist for Dry Ice" shipment form (attached) to confirm that the package meets IATA specifications. Notify the project manager if any box on the form is checked "yes."

24. Make arrangements with the testing laboratory to ensure the package will be received on its intended delivery date. When shipping samples, take into account holidays or closings that might delay package delivery.

Alternate Shipping Containers

Pre-made shipping container specifically designed for transport of perishable items are available for purchase. These containers are designed and constructed to permit the release of carbon dioxide gas to prevent a buildup of pressure that could rupture the package. Interior supports are provided to secure the secondary packaging in the original position after the dry ice has dissipated.

There is a 2-week lead time from January 15 through October 31 on all orders:

R.N.C. Industries, Inc.
Control Temp Packaging
(770) 368-8453
(888) 844-3864
http://www.rncind.com/index.php?page=control-temp-blue

Reusing an insulated dry ice shipping box can be a good use of resources. If a box is reused, then completely obliterate all unnecessary marking such as hazard labels, addresses, used FedEx labels, and barcodes. Only reuse a box if it is not contaminated and its integrity is intact. A box should not be reused if it is torn, cut, or stained, or if the insulation is cracked or broken.

ACCIDENT RESPONSE

Sampling personnel should follow all of the recommendations in the MSDS (attached) and take the following actions if they have an accident while using dry ice:

Inhalation: In case of inhalation, conscious persons should be assisted to an uncontaminated area and inhale fresh air. The person should be kept warmed and calm. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an

uncontaminated area and given assisted resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

Skin contact: Remove contaminated clothing and rinse affected skin with *lukewarm* water. Do not rinse with hot water. Provide medical prompt attention. Frozen tissue is painless and appears waxy, with a possible yellow color. Frozen tissue will become swollen, painful, and prone to infection when thawed.

Eye contact: Individuals in contact with this product should not wear contact lenses. Check for and remove any contact lenses. In case of contacts are worn, immediately flush eyes with plenty of water for at least 20 minutes. Seek medical attention.

Ingestion: If potentially dangerous quantities of this material are swallowed, call a physician immediately. Do not induce vomiting unless directed to do so by medical personnel.

Notes for physician: Notify medical personnel that the person may suffer from anoxia.

Material Safety Data Sheet
Dry Ice

NSN: 685000F002383
Part Number/Trade Name: Carbon Dioxide/Dry Ice

General Information

Date MSDS Prepared: 01 Jun 90
Safety Data Review Date: 06 Apr 94
Company Identification:
Air Products And Chemicals Inc.
7201 Hamilton Blvd
Allentown, PA 18195-1501
MSDS Serial Number: BBKVW

Ingredients/Identity Information

CAS#	Chemical Name	Percent	EINECS/ELINCS
124-38-9	Carbon Dioxide	100	

Proprietary: No
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: FF6400000
Exposure Limits:
OSHA PEL: 5000 PPM
ACGIH TLV: 9000 MG/CUM
Other Recommended Limit: 10000 PPM

Physical/Chemical Characteristics

Appearance And Odor: Colorless, odorless
Boiling Point: -109.3F
Melting Point: -69.9F
Vapor Pressure (MM Hg/70 F): 831 PSIA
Vapor Density (Air=1): 0.115
Specific Gravity: 1.56
Solubility In Water: APPRECIABLE

Fire and Explosion Hazard Data

Reactivity Data

Stability: Yes
Conditions To Avoid (Stability): Moisture

Materials To Avoid: Carbonic acid/salt/corrosive chemicals
Hazardous Polymerization Occurrence: No

Health Hazard Data

Route Of Entry - Inhalation: Yes
Route Of Entry - Skin: No
Route Of Entry - Ingestion: No
Health Hazard Acute and Chronic: Concentration in excess of 1.5% carbon dioxide may cause death. At higher concentrations, displaces oxygen in air below levels necessary to support life.
Carcinogenicity - NTP: No
Carcinogenicity - IARC: No
Carcinogenicity - OSHA: No
Explanation Carcinogenicity: None
Signs/Symptoms Of Overexposure: At concentrations >1.5%: Hyperventilation/headahces/ dyspnea/perspiration. At 6-10%: Headahces/dyspnea/perspiration/tremors/visual disturbances. >10%: Unconsciousness w/out warning. Cryogenic burns.
Emergency/First Aid Procedures: Inhalation: Remove to fresh air. Assisted respirant & supplemental oxygen should be given if not breathing. Frozen tissues should be flooded/soaked w/tepid water. Don't use hot water. Obtain medical attention in all cases.

Precautions for Safe Handling and Use

Steps if Material Released/Spill: Ventilate indoor areas well to avoid hazardous CO_2 concentrations. Ventilate area well & avoid contact w/cold vapors/dry ice. CO_2 is heavy gas & will remain in low spots w/out assisted ventilation.
Waste Disposal Method: Don't attempt to dispose of residual CO_2 in compressed gas cylinders. Return cylinders to air products w/residual pressure, cylinder valve tightly closed/the valve cap in place. Dispose of iaw/local/stat/ federal regulations. nonflammable gas. UN1013.
Precautions-Handling/Storing: Compress gas cylinders contain gaseous/liquid CO_2 at extremely high pressure/should handled w/care. Keep cylinders away from heat.
Other Precautions: Prevent contact of CO_2 on skin. Use pressure-reducing regulator when connecting to lower pressure piping systems. Secure cylinders when in use. Keep from combustibles. Avoid exposure to areas where salt/other corrosive materials are present.

Control Measures

Respiratory Protection: SCBA in oxygen deficient atmospheres/where CO_2 >1.5%. Don't use air purifying respirators.
Ventilation: Local Exhaust: At point sources of CO_2 vapors. Mechanical(general): Low lying area are not naturally ventilated.
Protective Gloves: Impermeable/loose fitting (leather)
Eye Protection: Safety glasses
Supplemental Safety & Health Data: CO_2 is stored in containers under its own vapor pressure. If the pressure is suddenly relieved, the liquid rapidly cools as it evaporates & sublimes, forming dry ice at -109.3F.

Transportation Data

Disposal Data

Disposal Data Review Date: 89018
Record # For This Disp Entry: 01
Total Disp Entries Per NSN: 001
Landfill Ban Item: Yes
Disposal Supplemental Data: Box 538, Allentown, PA 18105. Item not regulated as a RCRA Hazardous Waste by the Federal EPA, but may be regulated in certain states.
1st EPA Hazardous Waste Name New: Not regulated
1st EPA Hazardous Waste Char New: Not regulated by RCRA
1st EPA Acute Hazard New: No

Label Data

Label Required: Yes
Technical Review Date: 06 Apr 94
Label Date: 06 Apr 94
Label Status: F
Common Name: Carbon Dioxide/Dry Ice
Chronic Hazard: Yes
Signal Word: Danger!
Acute Health Hazard-Severe: X
Contact Hazard-Slight: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: Concentration in excess of 1.5% carbon dioxide may cause death. At higher concentrations, displaces oxygen in air below levels necessary to support life.
Target organs: Respiratory system, skin.
Carcinogen: Formaldehyde.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y

IATA

2011

ACCEPTANCE CHECKLIST FOR DRY ICE (Carbon Dioxide, solid)

(For use when a Shipper's Declaration for Dangerous Goods is not required)

A checklist is required for all shipments of dangerous goods (9.1.4) to enable proper acceptance checks to be made. The following example checklist is provided to assist shippers and carriers with the acceptance of dry ice when packaged on its own or with non-dangerous goods.

Is the following information correct for each entry?

	YES	NO	N/A
The Air Waybill contains the following information in the "Nature and Quantity of Goods" box (8.2.3)			
1. The UN Number "1845", preceded by the prefix "UN"	❑	❑	
2. The words "Carbon dioxide, solid" or "Dry ice"	❑	❑	
3. The number of packages of dry ice	❑	❑	
4. The net quantity of dry ice in kilograms	❑	❑	
Note: **The packing instruction "954" is optional.**			
Quantity			
5. The quantity of dry ice per package is 200 kg or less [4.2]	❑	❑	
Packages and Overpacks			
6. The number of packages containing dry ice delivered as shown on the Air Waybill	❑	❑	
7. Packages are free from damage and in a proper condition for carriage	❑	❑	
8. The packaging conforms with Packing Instruction 954 and the package is vented to permit the release of gas	❑	❑	
Markings & Labels			
9. The words "Carbon dioxide, solid" or "Dry ice" [7.1.5.1(a)]	❑	❑	
10. The UN number "1845" preceded by prefix "UN" [7.1.5.1(a)]	❑	❑	
11. Full name and address of the shipper and consignee [7.1.5.1(b)]	❑	❑	
12. The net quantity of dry ice within each package [7.1.5.1(d)]	❑	❑	
13. Class 9 label affixed [7.2.3.9]	❑	❑	
14. Irrelevant marks and labels removed [7.1.1(b); 7.2.1(a)]	❑	❑	❑
Note: **The Marking and labelling requirements do not apply to ULDs containing dry ice**			
State and Operator Variations			
15. State and operator variations complied with [2.8]	❑	❑	❑

Comments: _____

_____

Checked by: _____

Place: _____ Signature: _____

Date: _____ Time: _____

***IF ANY BOX IS CHECKED "NO", DO NOT ACCEPT THE SHIPMENT AND GIVE A DUPLICATE COPY OF THIS COMPLETED FORM TO THE SHIPPER.**

SAFETY DATA SHEET

Carbon Dioxide, Solid or Dry Ice

Section 1. Identification

GHS product identifier : Carbon Dioxide, Solid or Dry Ice

Chemical name : Carbon dioxide

Other means of identification : carbonice ; dry ice 6

Product use : Synthetic/Analytical chemistry.

Synonym : carbonice ; dry ice 6

SDS # : 001091

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

Classification of the substance or mixture : Not classified. Not a dangerous substance or mixture according to the Globally Harmonised System (GHS).

GHS label elements

Signal word : Warning

Hazard statements : May displace oxygen and cause rapid suffocation.
May increase respiration and heart rate.
May cause frostbite.

Precautionary statements

General : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

Prevention : Not applicable.

Response : Not applicable.

Storage : Not applicable.

Disposal : Not applicable.

Hazards not otherwise classified : Contact with cryogenic liquid can cause frostbite and cryogenic burns.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : Carbon dioxide

Other means of identification : carbonice ; dry ice 6

CAS number/other identifiers

CAS number : 124-38-9

Product code : 001091

Ingredient name	%	CAS number
Carbon Dioxide	100	124-38-9

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.

Ingestion : Wash out mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : May cause eye irritation.

Inhalation : May be harmful if inhaled. May cause respiratory irritation.

Skin contact : Harmful if absorbed through the skin. May cause skin irritation.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : May be harmful if swallowed and enters airways.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training.

Section 4. First aid measures

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : No specific fire or explosion hazard.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Move containers from spill area. Vacuum or sweep up material and place in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8).

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Carbon Dioxide	**ACGIH TLV (United States, 3/2012). Oxygen Depletion [Asphyxiant].** STEL: 54000 mg/m³ 15 minutes. STEL: 30000 ppm 15 minutes. TWA: 9000 mg/m³ 8 hours. TWA: 5000 ppm 8 hours. **NIOSH REL (United States, 1/2013).** STEL: 54000 mg/m³ 15 minutes. STEL: 30000 ppm 15 minutes. TWA: 9000 mg/m³ 10 hours. TWA: 5000 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 9000 mg/m³ 8 hours. TWA: 5000 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** STEL: 54000 mg/m³ 15 minutes. STEL: 30000 ppm 15 minutes. TWA: 18000 mg/m³ 8 hours. TWA: 10000 ppm 8 hours.

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Section 8. Exposure controls/personal protection

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Solid. [WHITE SNOW-LIKE SOLID]

Color : White.

Molecular weight : 44.01 g/mole

Molecular formula : C-O2

Melting/freezing point : Sublimation temperature: -78.5°C (-109.3 to °F)

Critical temperature : 31°C (87.8°F)

Odor : Not available.

Odor threshold : Not available.

pH : Not available.

Flash point : Not available.

Burning time : Not available.

Burning rate : Not available.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : Not available.

Vapor density : Not available.

Specific Volume (ft^3/lb) : 0.7407

Gas Density (lb/ft^3) : 1.35

Relative density : Not available.

Solubility : Not available.

Solubility in water : Not available.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Section 9. Physical and chemical properties

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not available.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatibility with various substances : Not considered to be reactive according to our database.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Section 11. Toxicological information

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : May cause eye irritation.

Inhalation : May be harmful if inhaled. May cause respiratory irritation.

Skin contact : Harmful if absorbed through the skin. May cause skin irritation.

Ingestion : May be harmful if swallowed and enters airways.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1845	UN1845	UN1845	UN1845	UN1845
UN proper shipping name	CARBON DIOXIDE, SOLID OR DRY ICE	CARBON DIOXIDE, SOLID; OR DRY ICE	CARBON DIOXIDE, SOLID OR DRY ICE	CARBON DIOXIDE, SOLID (DRY ICE)	CARBON DIOXIDE, SOLID
Transport hazard class(es)	9 	9 	9 	9 	9 
Packing group	III	III	-	III	III
Environment	Yes.	Yes.	Yes.	No.	No.
Additional information	**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 200 kg **Cargo aircraft** Quantity limitation: 200 kg	**Explosive Limit and Limited Quantity Index** 5 **Passenger Carrying Ship Index** 200 **Special provisions** 18	-	-	The environmentally hazardous substance mark may appear if required by other transportation regulations. **Passenger and Cargo Aircraft** Quantity limitation: 200 kg **Cargo Aircraft Only** Quantity limitation: 200

Section 14. Transport information

					kg

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: This material is listed or exempted.
United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Carbon Dioxide (Dry Ice)	100%	No	No	No	Yes	No

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

Canada inventory : This material is listed or exempted.

International regulations

Section 15. Regulatory information

International lists : **Australia inventory (AICS)**: This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: This material is listed or exempted.
Korea inventory: This material is listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

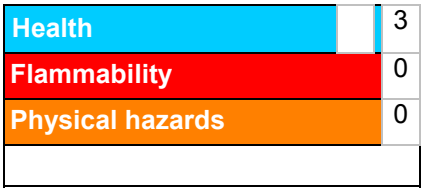
WHMIS (Canada) : Not controlled under WHMIS (Canada).

CEPA Toxic substances: This material is listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is not listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Not controlled under WHMIS (Canada).

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

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Section 16. Other information

History

Date of printing : 6/8/2015.

Date of issue/Date of revision : 6/8/2015.

Date of previous issue : 6/8/2015.

Version : 0.08

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
CAS – Chemical Abstract Services
CEPA – Canadian Environmental Protection Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
CFR – United States Code of Federal Regulations
CPR – Controlled Products Regulations
DSL – Domestic Substances List
GWP – Global Warming Potential
IARC – International Agency for Research on Cancer
ICAO – International Civil Aviation Organisation
Inh – Inhalation
LC – Lethal concentration
LD – Lethal dosage
NDSL – Non-Domestic Substances List
NIOSH – National Institute for Occupational Safety and Health
TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

EXHIBIT 1
STANDARD OPERATING PROCEDURE AND SAFETY DATA SHEET FOR USING DRY ICE

HEAT EXHAUSTION

What happens to the body:

Headaches, dizziness, or light-headedness, weakness, mood changes, irritability or confusion, feeling sick to your stomach, vomiting, fainting, decreased and dark-colored urine, and pale, clammy skin.

What should be done:

- Move the person to a cool shaded area. Don't leave the person alone. If the person is dizzy or light-headed, lay him on his back and raise his legs about 6-8 inches. If the person is sick to his stomach, lay him on his side.
- Loosen and remove heavy clothing.
- Have the person drink some cool water (a small cup every 15 minutes) if he is not feeling sick to his stomach.
- Try to cool the person by fanning him. Cool the skin with a cool spray mist of water or wet cloth.
- If the person does not feel better in a few minutes call for emergency help (ambulance or call 911.)

(If heat exhaustion is not treated, the illness may advance to heat stroke.)

HEAT STROKE - A Medical Emergency

What happens to the body:

Dry, pale skin (no sweating); hot red skin (looks like a sunburn); mood changes; irritability, confusion, and not making any sense; seizures or fits, and collapse (will not respond).

What should be done:

- Call for emergency help (i.e., ambulance or 911.)
- Move the person to a cool, shaded area. Don't leave the person alone. Lay him on his back and if the person is having seizures, remove objects close to him so he won't hit them. If the person is sick to his stomach, lay him on his side.
- Remove heavy and outer clothing.
- Have the person drink some cool water (a small cup every 15 minutes) if he is alert enough to drink anything and not feeling sick to his stomach.
- Try to cool the person by fanning him or her. Cool the skin with a cool spray mist of water, wet cloth, or wet sheet.
- If ice is available, place ice packs in armpits and groin area.

How to Protect Workers

- Learn the signs and symptoms of heat-induced illnesses and what to do to help the worker.
- Train workers about heat-induced illnesses.
- Perform the heaviest work during the coolest part of the day.
- Slowly build up tolerance to the heat and the work activity (usually takes up to 2 weeks.)
- Use the buddy system (work in pairs.)
- Drink plenty of cool water (one small cup every 15-20 minutes.)
- Wear light, loose-fitting, breathable (like cotton) clothing.
- Take frequent short breaks in cool, shaded areas (allow your body to cool down.)
- Avoid eating large meals before working in hot environments.
- Avoid caffeine and alcoholic beverages (these beverages make the body lose water and increase the risk of heat illnesses.)

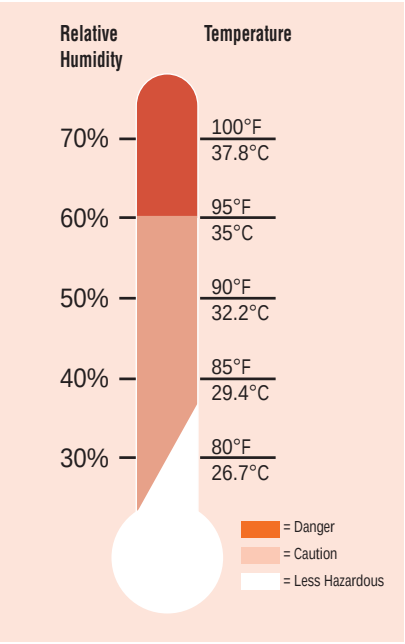
Workers are at increased risk when…

- They take certain medications. Check with your doctor, nurse, or pharmacy to see if medicines you take affect you when working in hot environments.
- They have had a heat-induced illness in the past.
- They wear personal protective equipment.

THE HEAT EQUATION

HIGH TEMPERATURE + HIGH HUMIDITY + PHYSICAL WORK = HEAT ILLNESS

When the body is unable to cool itself through sweating, **serious** heat illnesses may occur. The most severe heat-induced illnesses are **heat exhaustion** and **heat stroke**. If actions are not taken to treat heat exhaustion, the illness could progress to heat stroke and **death**.



Oregon Occupational Safety & Health Division
440-3333E-S(9/03)

You Have a Right to a Safe and Healthful Workplace.

IT'S THE LAW!

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in the inspection.
- You can file a complaint with OSHA within 30 days of discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have a right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violation.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records or records of your exposure to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.

The *Occupational Safety and Health Act of 1970 (OSH Act)*, P.L. 91-596, assures safe and healthful working conditions for working men and women throughout the Nation. The Occupational Safety and Health Administration, in the U.S. Department of Labor, has the primary responsibility for administering the *OSH Act*. The rights listed here may vary depending on the particular circumstances. To file a complaint, report an emergency, or seek OSHA advice, assistance, or products, call 1-800-321-OSHA or your nearest OSHA office: • Atlanta (404) 562-2300 • Boston (617) 565-9860 • Chicago (312) 353-2220 • Dallas (214) 767-4731 • Denver (303) 844-1600 • Kansas City (816) 426-5861 • New York (212) 337-2378 • Philadelphia (215) 861-4900 • San Francisco (415) 975-4310 • Seattle (206) 553-5930. Teletypewriter (TTY) number is 1-877-889-5627. To file a complaint online or obtain more information on OSHA federal and state programs, visit OSHA's website at **www.osha.gov**. If your workplace is in a state operating under an OSHA-approved plan, your employer must post the required state equivalent of this poster.

1-800-321-OSHA
www.osha.gov

U.S. Department of Labor • **Occupational Safety and Health Administration** • **OSHA 3165**

EXHIBIT 3
FIELD SAFETY BRIEFING

integral consulting inc.

SAFETY BRIEFING

CHSM: Matthew Behum (410) 573-1982 ext.512

Date/Time: _____ Project Name: _____ Project Number: _____

Meeting Conductor: _____ Site Safety Officer: _____ Project Manager: _____

- □ HASP Review & Location
- □ Lines of Authority
- □ Chemical Hazards & Exposure Routes
- □ Flammable Hazards
- □ Lifting Techniques
- □ Buddy System
- □ Self & Coworker Monitoring
- □ Biological/Plant/ Animal Hazards
- □ Slips, Trips, & Falls
- □ Heat & Cold Stress
- □ Overhead Hazards
- □ Vessel Safety Protocols
- □ Proper Use of PPE
- □ Safety Equipment Location
- □ Proper Safety Equipment Use
- □ Fire Extinguisher Location
- □ Eye Wash Station Location
- □ Emergency Procedures & Evacuation Route
- □ Directions to Hospital
- □ Emergency Decontamination Procedures
- □ Site Communication
- □ Work Zones
- □ Site Security
- □ Vehicle Safety & Driving/Road Conditions
- □ Equipment Safety & Operation
- □ Other _____

Field Staff H&S Concerns: _____

Weather Conditions: _____

Daily Work Scope: _____

Site-Specific Hazards: _____

ATTENDEES

Printed Name	Signature